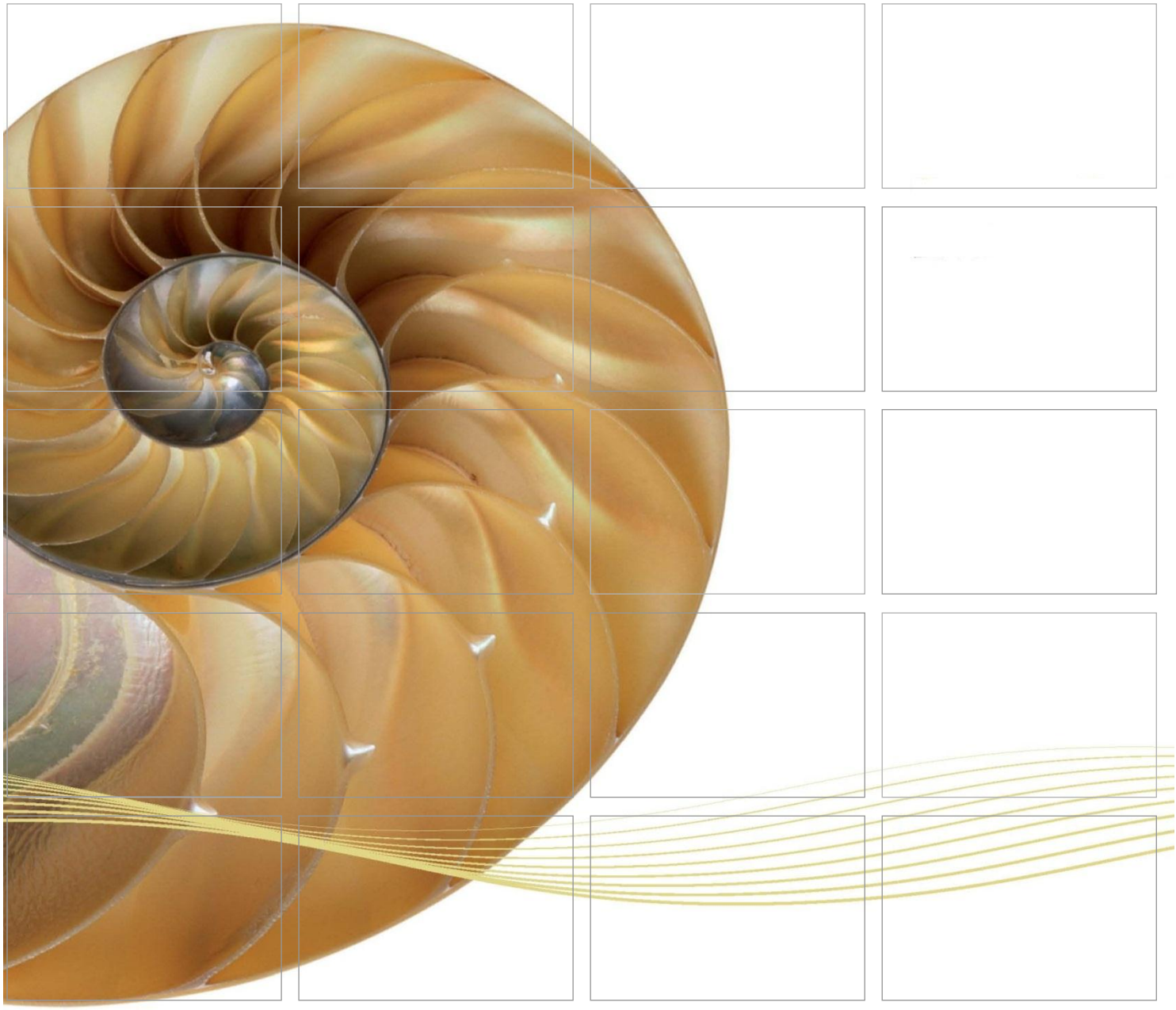
Report



Contract No. HY/2012/07
Tuen Mun – Chek Lap Kok Link – Southern Connection Viaduct Section

Third Quarterly Post-Translocation Coral Monitoring Report

13 August 2014

Environmental Resources Management
16/F, Berkshire House
25 Westlands Road
Quarry Bay, Hong Kong
Telephone 2271 3000
Facsimile 2723 5660

www.erm.com

ERM

The world's leading sustainability consultancy

Contract No. HY/2012/07
Tuen Mun – Chek Lap Kok Link – Southern Connection Viaduct Section

Third Quarterly Post-Translocation Coral Monitoring Report

Document Code: 0215660_3rd Quarterly Coral Translocation Report_Southern_20140808.doc

Environmental Resources Management

16/F, Berkshire House
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3000
Facsimile: (852) 2723 5660
E-mail: post.hk@erm.com
http://www.erm.com

Client:	Project No:
Gammon	0215660
Summary:	Date: 13 August 2014
This document presents the Third Quarterly Post-Translocation Coral Monitoring Report for Tuen Mun – Chek Lap Kok Link Southern Connection Viaduct Section.	Approved by: *Mr Craig Reid* *Partner*
	Certified by: *Mr Jovy Tam* *ET Leader*

Revision	Description	By	Checked	Approved	Date
	Third Post-Translocation Coral Monitoring Report	VAR	JT	CAR	13/08/14

Distribution

☐ Internal

☒ Public

☐ Confidential

OHSAS 18001:2007 Certificate No. OHS 515956

ISO 9001 : 2008 Certificate No. FS 32515

ENVIRON

Ref.: HYDHZMBEEM00_0_2187L.14 26 August 2014

AECOM By Fax (3691 2899) and By Post
Supervising Officer's Representative's Office
780 Cheung Tung Road, Lantau, N.T.

Attention: Mr. Daniel Ip

Dear Mr. Ip,

Re: Agreement No. CE 48/2011 (EP)
Environmental Project Office for the
HZMB Hong Kong Link Road, HZMB Hong Kong Boundary Crossing Facilities, and Tuen Mun-Chek Lap Kok Link – Investigation

Contract No. HY/2012/07 TM-CLKL Southern Connection Viaduct Section
Third Quarterly Post-Translocation Coral Monitoring Report

Reference is made to the Third Quarterly Post-Translocation Coral Monitoring Report certified by the ET Leader (ET's ref.: "0215660_3rd Quarterly Coral Translocation Report_Southern_20140808.doc" dated 13 August 2014) and provided to us via email on 25 August 2014.

We are pleased to inform you that we have no adverse comments on the captioned report.

Please do not hesitate to contact the undersigned or the ENPO Leader Mr. Y. H. Hui should you have any query.

Yours sincerely,

F. C. Tsang
Independent Environmental Checker
Tuen Mun – Chek Lap Kok Link

c.c. HyD – Mr. Stephen Chan (By Fax: 3188 6614)
HyD – Mr. Matthew Fung (By Fax: 3188 6614)
AECOM – Mr. Conrad Ng (By Fax: 3922 9797)
ERM – Mr. Jovy Tam (By Fax: 2723 5660)
Gammon – Mr. Roy Leung (By Fax: 3520 0486)

Internal: DY, YH, ENPO Site

Q:\Projects\HYDHZMBEEM00\02_Proj_Mgt\02_Corr\HYDHZMBEEM00_0_2187L.14.doc

ENVIRON Hong Kong Limited 英環香港有限公司
Room 2403, 24/F., Jubilee Centre, 18 Fenwick Street, Wanchai, Hong Kong Tel: 852.3465 2888 Fax: 852.3465 2899
www.environcorp.com

CONTENTS

1 INTRODUCTION

1.1 BACKGROUND

According to findings of the Northwest New Territories (NWNT) Traffic and Infrastructure Review conducted by the Transport Department, Tuen Mun Road, Ting Kau Bridge, Lantau Link and North Lantau Highway would be operating beyond capacity after 2016. This forecast has been based on the estimated increase in cross boundary traffic, developments in the NWNT, and possible developments in North Lantau, including the Airport developments, the Lantau Logistics Park (LLP) and the Hong Kong – Zhuhai – Macao Bridge (HZMB). In order to cope with the anticipated traffic demand, two new road sections between NWNT and North Lantau – Tuen Mun – Chek Lap Kok Link (TM-CLKL) and Tuen Mun Western Bypass (TMWB) are proposed.

An Environmental Impact Assessment (EIA) of TM-CLKL was prepared in accordance with the EIA Study Brief (No. ESB-175/2007) and the *Technical Memorandum of the Environmental Impact Assessment Process* (*EIAO-TM*). The EIA Report was submitted under the Environmental Impact Assessment Ordinance (EIAO) in August 2009. Subsequent to the approval of the EIA Report (EIAO Register Number AEIAR-145/2009), an Environmental Permit (EP-354/2009) for TM-CLKL was granted by the Director of Environmental Protection (DEP) on 4 November 2009, and EP variation (*EP-354/2009A*) was issued on 8 December 2010. Another application for variation of environmental permit (VEP) (*EP-354/2009/B*) was granted on 28 January 2014.

Pursuant to Condition 2.6 of the EP, the Detailed Coral Translocation Methodology (1) has been submitted on 9 October 2013 and was subsequently approved by the DEP for this Contract. Coral translocation was undertaken for the coral colonies at Tai Ho Wan on 24 October 2013 prior to the construction of temporary staging and the Southern Connection Viaduct Section in order to reduce the potential marine ecological impacts by translocating movable coral colonies to the receptor site at Yam Tsai Wan. In accordance with the Detailed Coral Translocation Methodology, the translocated coral colonies as well as the tagged natural coral colonies at the receptor site will be monitored once every three (3) months for a period of 12 months after the coral translocation exercise.

1.2 PURPOSE OF THIS REPORT

The purpose of this *Third Quarterly Post-Translocation Coral Monitoring Report* is to report findings of the Third Quarterly Post-translocation Coral Monitoring which is undertaken at the receptor site, Yam Tsai, Wan, to monitor the

(1) ERM (October 2013) Detailed Coral Translocation Methodology. Prepared under Contract No. HY/2012/07 – TM-CLKL Southern Connection Viaduct Section

updated status of translocated corals from the donar site at Tai Ho Wan. The results of the post-translocation monitoring are reviewed with reference to findings of the pre-translocation survey in order to assess any observable changes in status of the translocated coral colonies. Post-translocation monitoring results are also evaluated against Action and Limit Levels which are based on recorded changes in percentage of partial mortality of the corals.

1.3 STRUCTURE OF THIS REPORT

The remainder of the report is structured as follows:

Section 2: Third Quarterly Post-Translocation – Details the methodology and results of the Third Quarterly Post-translocation Coral Monitoring.

Section 3: Schedule of Quarterly Post-translocation Coral Monitoring – Details the tentative schedule of the subsequent Quarterly Post-translocation Coral Monitoring.

Section 4: Conclusion – Concludes the Third Post-translocation Coral Monitoring results for the Contract.

2.1 POST-TRANSLOCATION MONITORING METHODOLOGY

Pre-translocation surveys were undertaken at the donar site of Tai Ho Wan and receptor site of Yam Tsai Wan to collect baseline data on translocated coral colonies from Tai Ho Wan and natural coral colonies at Yam Tsai Wan during the coral translocation exercise in October 2013. During the pre-translocation survey, thirteen (13) *Guaiagorgia* sp. colonies, which were successfully translocated from Tai Ho Wan to Yam Tsai Wan, were tagged for monitoring. In addition to the translocated coral colonies, ten (10) colonies of *Guaiagorgia* sp. were tagged at the receptor site. Each of the tagged coral colonies was identified at least to genus levels and photographed. The following data were recorded for each tagged coral colonies during the pre-translocation survey:

- Genus/ Species;
- Size (Maximum diameter/ height);
- Mortality (%);
- Bleaching (%); and,
- Sediment (%).

During the Post-translocation Coral Monitoring, the tagged coral colonies were re-visited for monitoring using the same methodology as the pre-translocation survey. Photographic records of the translocated and natural coral colonies were taken by maintaining the same aspect and orientation as photographs taken for the pre-translocation surveys as far as possible. The adoption of the same monitoring method would allow for direct comparison of baseline pre-location data with the post-translocation monitoring data in order to determine any changes in conditions of corals. The general environmental conditions including weather, sea and tidal conditions of the coral receptor site were also monitored.

The results of the post-translocation monitoring were reviewed with reference to findings of the pre-translocation surveys undertaken at the donor and receptor sites. If observations of any die-off / abnormal conditions of the translocated corals are made during the post-translocation monitoring, the ET should inform the Contractor, Independent Environmental Checker (IEC) / Environmental Project Office (ENPO), and AFCD, and liaise with AFCD to investigate any mitigation measures needed.

Post-translocation Coral Monitoring results were evaluated against Action and Limit Levels which is based on the recorded changes in the percentage of partial mortality of the corals (*Table 2.1).* If the defined Action Level or Limit Level for coral monitoring is exceeded, the actions set out in *Table 2.2* will be implemented.

Table 2.1 Action and Limit Levels for Post-Translocation Coral Monitoring

Parameter	Action Level Definition	Limit Level Definition
Mortality	If during Impact Monitoring a 15% increase in the percentage of partial mortality on the corals occurs at more than 20% of the translocated coral colonies that is not recorded on the original corals at the receptor site, then the Action Level is exceeded.	If during Impact Monitoring a 25% increase in the percentage of partial mortality on the corals occurs at more than 20% of the translocated coral colonies that is not recorded on the original corals at the receptor site, then the Limit Level is exceeded.

Table 2.2 Event and Action Plan for Post-Translocation Coral Monitoring

Event	Action			
	ET Leader	IEC	SOR	Contractor
Action Level Exceedance	1. Check monitoring data 2. Inform the IEC, SOR and Contractor of the findings; 3. Increase the monitoring to at least once a month to confirm findings; 4. Propose mitigation measures for consideration	1. Discuss monitoring with the ET and the Contractor; 2. Review proposals for additional monitoring and any other measures submitted by the Contractor and advise the SOR accordingly.	1. Discuss with the IEC additional monitoring requirements and any other measures proposed by the ET; 2. Make agreement on the measures to be implemented.	1. Inform the SOR and confirm notification of the non-compliance in writing; 2. Discuss with the ET and the IEC and propose measures to the IEC and the SOR; 3. Implement the agreed measures.
Limit Level Exceedance	1. Undertake Steps 1-4 as in the Action Level Exceedance. If further exceedance of Limit Level, propose enhancement measures for consideration.	1. Discuss monitoring with the ET and the Contractor; 2. Review proposals for additional monitoring and any other measures submitted by the Contractor and advise the SOR accordingly.	1. Discuss with the IEC additional monitoring requirements and any other measures proposed by the ET; 2. Make agreement on the measures to be implemented.	1. Inform the SOR and confirm notification of the non-compliance in writing; 2. Discuss with the ET and the IEC and propose measures to the IEC and the SOR; 3. Implement the agreed measures.

2.2 *THIRD QUARTERLY POST-TRANSLOCATION CORAL MONITORING RESULTS*

The Third Quarterly Post-translocation Coral Monitoring was carried out at the receptor site, Yam Tsai Wan, on 24 July 2014. The weather conditions during the survey date are summarized in *Table 2.3*. Location of the survey area at the receptor site is presented in *Figure 2.1*.

Table 2.3 Weather Conditions during the Third Quarterly Post-Translocation Coral Monitoring Survey

Date	Location	Condition	Underwater Visibility
24 July 2014	Receptor site: Yam Tsai Wan	East force 4 to 5 Sunny periods	Less than 0.5 m

The species, size, mortality percentage, bleaching percentage and percentage of sediment cover of the translocated coral colonies and natural coral colonies recorded during the Third Quarterly Post-translocation Monitoring Surveys were summarized in *Tables 2.4* and *2.5*. Photographic records taken during the Third Quarterly Post-translocation Coral Monitoring are shown in *Annex A*.

Findings of the Third Quarterly Post-translocation Monitoring indicated that the Action or Limit Levels for coral monitoring were not exceeded as increase in percentage of partial mortality was not detected for both the tagged translocated and natural coral colonies when comparing to the pre-translocation dataset (*Tables 2.4 & 2.5*). As such, it is considered not necessary to undertake any action in accordance with the Event and Action Plan.

Overall, findings of the Third Quarterly Post-translocation Monitoring did not appear to indicate any deterioration in the general health conditions of the translocated and natural coral colonies at the receptor site during this quarterly period.

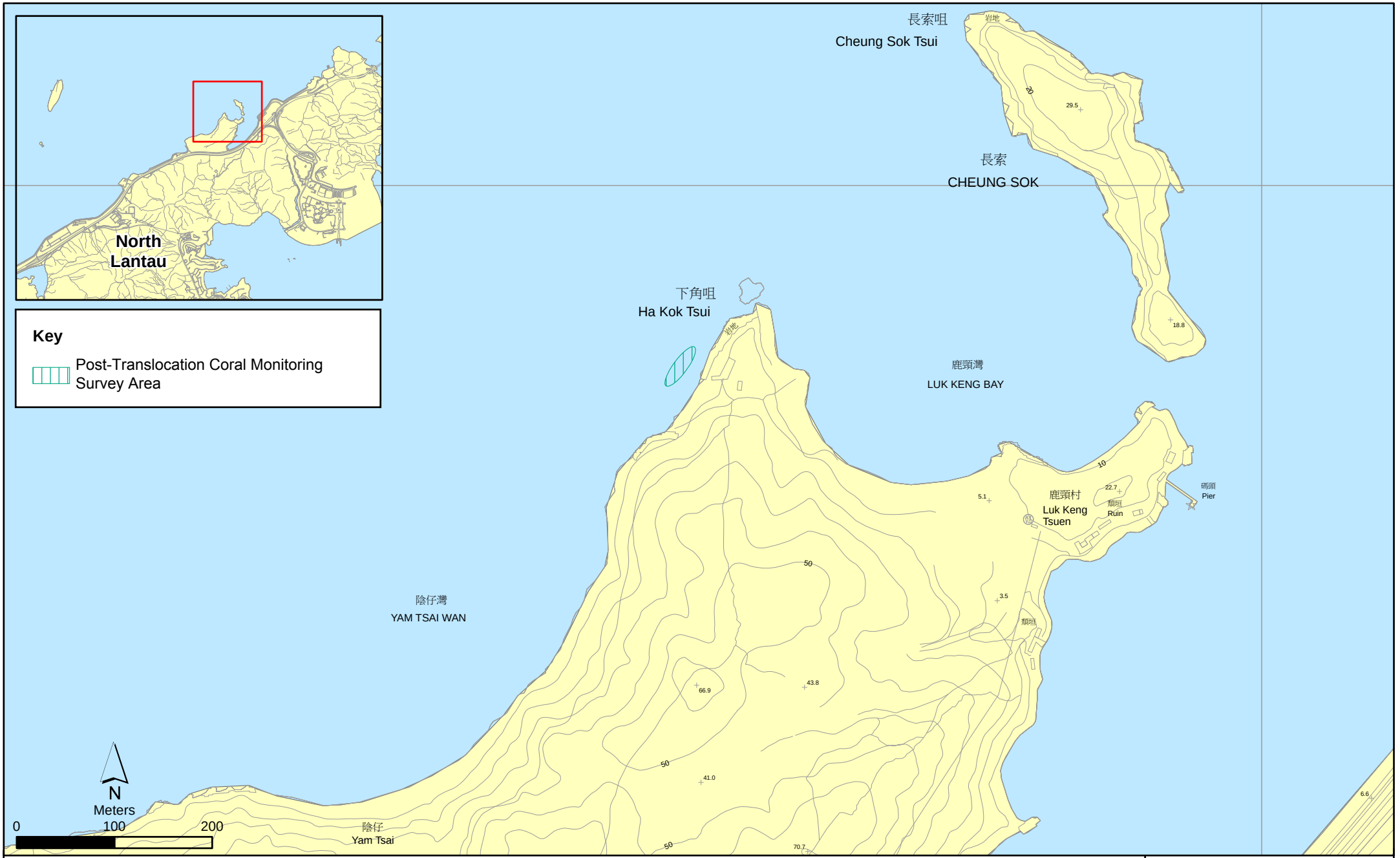


Figure 2.1

Post-translocation Coral Monitoring Survey Area under both Contract No. HY/2012/07 and HY/2012/08

File: T:\GIS\CONTRACT\0212330\Mxd\0212330_Area_w_translocate_coral.mxd
Date: 27/2/2014

Environmental Resources Management

ERM

Table 2.4 Sizes, Partial Mortality, Bleaching and Sediment Cover of Tagged Translocated Coral Colonies from Donor Site, Tai Ho Wan, recorded during the Pre-translocation, First, Second and Third Quarterly Post-translocation Coral Monitoring Surveys

Coral #	Species	Size (cm) – Max Diameter/ Height	Partial Mortality (%)	Percentage Increase in Partial Mortality (%) (1)	Bleaching (%)	Sediment (%)
Pre-translocation Survey on 23 October 2013 at the donor site, Tai Ho Wan						
1	*Guaiagorgia* sp.	7	0	N/A	N/A	0
2	*Guaiagorgia* sp.	9	0	N/A	N/A	0
3	*Guaiagorgia* sp.	5	0	N/A	N/A	0
4	*Guaiagorgia* sp.	8	0	N/A	N/A	0
5	*Guaiagorgia* sp.	13	10	N/A	N/A	0
6	*Guaiagorgia* sp.	8	70	N/A	N/A	0
7	*Guaiagorgia* sp.	6	0	N/A	N/A	0
8	*Guaiagorgia* sp.	7	0	N/A	N/A	0
9	*Guaiagorgia* sp.	19	50	N/A	N/A	0
10	*Guaiagorgia* sp.	15	35	N/A	N/A	0
11	*Guaiagorgia* sp.	22	55	N/A	N/A	0
12	*Guaiagorgia* sp.	14	20	N/A	N/A	0
13	*Guaiagorgia* sp.	16	45	N/A	N/A	0
First Quarterly Post-translocation Coral Monitoring Survey on 17 January 2014 at the Receptor Site, Yam Tsai Wan						
1	*Guaiagorgia* sp.	7	0	0	N/A	0
2	*Guaiagorgia* sp.	9	0	0	N/A	0
3	*Guaiagorgia* sp.	5	0	0	N/A	0
4	*Guaiagorgia* sp.	8	0	0	N/A	0
5	*Guaiagorgia* sp.	13	10	0	N/A	0
6	*Guaiagorgia* sp.	8	70	0	N/A	0
7	*Guaiagorgia* sp.	6	0	0	N/A	0
8	*Guaiagorgia* sp.	7	0	0	N/A	0
9	*Guaiagorgia* sp.	19	50	0	N/A	0
10	*Guaiagorgia* sp.	15	35	0	N/A	0
11	*Guaiagorgia* sp.	22	55	0	N/A	0
12	*Guaiagorgia* sp.	14	20	0	N/A	0
13	*Guaiagorgia* sp.	16	45	0	N/A	0
Second Quarterly Post-translocation Coral Monitoring Survey on 16 April 2014 at the Receptor Site, Yam Tsai Wan						
1	*Guaiagorgia* sp.	7	0	0	N/A	0
2	*Guaiagorgia* sp.	9	0	0	N/A	0
3	*Guaiagorgia* sp.	5	0	0	N/A	0
4	*Guaiagorgia* sp.	8	0	0	N/A	0

Coral #	Species	Size (cm) – Max Diameter/ Height	Partial Mortality (%)	Percentage Increase in Partial Mortality (%) (1)	Bleaching (%)	Sediment (%)
5	*Guaiagorgia* sp.	13	10	0	N/A	0
6	*Guaiagorgia* sp.	8	70	0	N/A	0
7	*Guaiagorgia* sp.	6	0	0	N/A	0
8	*Guaiagorgia* sp.	7	0	0	N/A	0
9	*Guaiagorgia* sp.	19	50	0	N/A	0
10	*Guaiagorgia* sp.	15	35	0	N/A	0
11	*Guaiagorgia* sp.	22	55	0	N/A	0
12	*Guaiagorgia* sp.	14	20	0	N/A	0
13	*Guaiagorgia* sp.	16	45	0	N/A	0
Third Quarterly Post-translocation Coral Monitoring Survey on 24 July 2014 at the Receptor Site, Yam Tsai Wan						
1	*Guaiagorgia* sp.	7	0	0	N/A	0
2	*Guaiagorgia* sp.	9	0	0	N/A	0
3	*Guaiagorgia* sp.	5	0	0	N/A	0
4	*Guaiagorgia* sp.	8	0	0	N/A	0
5	*Guaiagorgia* sp.	13	10	0	N/A	0
6	*Guaiagorgia* sp.	8	70	0	N/A	0
7	*Guaiagorgia* sp.	6	0	0	N/A	0
8	*Guaiagorgia* sp.	7	0	0	N/A	0
9	*Guaiagorgia* sp.	19	50	0	N/A	0
10	*Guaiagorgia* sp.	15	35	0	N/A	0
11	*Guaiagorgia* sp.	22	55	0	N/A	0
12	*Guaiagorgia* sp.	14	20	0	N/A	0
13	*Guaiagorgia* sp.	16	45	0	N/A	0

Note:
(1) Represents percentage increase in partial mortality from the Pre-translocation Surveys to the Post-translocation Coral Monitoring Surveys.
(2) N/A = Not Applicable

Table 2.5 Sizes, Mortality, Bleaching and Sediment of Tagged Natural Coral Colonies at Receptor Site, Yam Tsai Wan, recorded during the Pre-translocation, First, Second and Third Quarterly Post-translocation Coral Monitoring Surveys

Coral #	Species	Size (cm) – Max. Diameter/ Height	Partial Mortality (%)	Percentage Increase in Partial Mortality (%) (1)	Bleaching (%)	Sediment (%)
Pre-translocation Survey on 24 October 2013						
1	*Guaiagorgia* sp.	25	5	N/A	N/A	0
2	*Guaiagorgia* sp.	32	35	N/A	N/A	0
3	*Guaiagorgia* sp.	28	15	N/A	N/A	0
4	*Guaiagorgia* sp.	38	25	N/A	N/A	0
5	*Guaiagorgia* sp.	27	40	N/A	N/A	0
6	*Guaiagorgia* sp.	28	25	N/A	N/A	0
7	*Guaiagorgia* sp.	21	10	N/A	N/A	0
8	*Guaiagorgia* sp.	26	30	N/A	N/A	0
9	*Guaiagorgia* sp.	19	50	N/A	N/A	0
10	*Guaiagorgia* sp.	35	35	N/A	N/A	0
First Quarterly Post-translocation Monitoring Survey on 17 January 2014						
1	*Guaiagorgia* sp.	25	5	0	N/A	0
2	*Guaiagorgia* sp.	32	35	0	N/A	0
3	*Guaiagorgia* sp.	28	15	0	N/A	0
4	*Guaiagorgia* sp.	38	25	0	N/A	0
5	*Guaiagorgia* sp.	27	40	0	N/A	0
6	*Guaiagorgia* sp.	28	25	0	N/A	0
7	*Guaiagorgia* sp.	21	10	0	N/A	0
8	*Guaiagorgia* sp.	26	30	0	N/A	0
9	*Guaiagorgia* sp.	19	50	0	N/A	0
10	*Guaiagorgia* sp.	35	35	0	N/A	0
Second Quarterly Post-translocation Monitoring Survey on 16 April 2014						
1	*Guaiagorgia* sp.	25	5	0	N/A	0
2	*Guaiagorgia* sp.	32	35	0	N/A	0
3	*Guaiagorgia* sp.	28	15	0	N/A	0
4	*Guaiagorgia* sp.	38	25	0	N/A	0
5	*Guaiagorgia* sp.	27	40	0	N/A	0
6	*Guaiagorgia* sp.	28	25	0	N/A	0
7	*Guaiagorgia* sp.	21	10	0	N/A	0
8	*Guaiagorgia* sp.	26	30	0	N/A	0
9	*Guaiagorgia* sp.	19	50	0	N/A	0
10	*Guaiagorgia* sp.	35	35	0	N/A	0

Coral #	Species	Size (cm) – Max. Diameter/ Height	Partial Mortality (%)	Percentage Increase in Partial Mortality (%) (1)	Bleaching (%)	Sediment (%)
Third Quarterly Post-translocation Monitoring Survey on 24 July 2014						
1	*Guaiagorgia* sp.	25	5	0	N/A	0
2	*Guaiagorgia* sp.	32	35	0	N/A	0
3	*Guaiagorgia* sp.	28	15	0	N/A	0
4	*Guaiagorgia* sp.	38	25	0	N/A	0
5	*Guaiagorgia* sp.	27	40	0	N/A	0
6	*Guaiagorgia* sp.	28	25	0	N/A	0
7	*Guaiagorgia* sp.	21	10	0	N/A	0
8	*Guaiagorgia* sp.	26	30	0	N/A	0
9	*Guaiagorgia* sp.	19	50	0	N/A	0
10	*Guaiagorgia* sp.	35	35	0	N/A	0

Note:
(1) Represents percentage increase in partial mortality from the Pre-translocation Surveys to the Post-translocation Coral Monitoring Surveys.
(2) N/A = Not Applicable

3 SCHEDULE OF QUARTERLY POST-TRANSLOCATION CORAL MONITORING

Post-Translocation Coral Monitoring will be conducted every three (3) months for a period of 12 months. The tentative schedule of the subsequent quarterly post-translocation monitoring is provided in *Table 3.1* below.

Table 3.1 Schedule of Quarterly Post-Translocation Monitoring

Post-Translocation Monitoring Survey (1)	**Timing**
1st Quarterly Monitoring	3 months after the translocation works Conducted on 17 January 2014
2nd Quarterly Monitoring	6 months after the translocation works Conducted on 16 April 2014
3rd Quarterly Monitoring	9 months after the translocation works Conducted on 24 July 2014
4th Quarterly Monitoring	12 months after the translocation works October 2014

Note:
(1) Shaded cell indicates completed quarterly monitoring.

4 CONCLUSION

The Third Quarterly Post-Translocation Coral Monitoring has been carried out on 24 July 2014 at the receptor site, Yam Tsai Wan, as per the requirements stipulated in the *Detailed Coral Translocation Methodology*. During the monitoring, 13 translocated coral colonies and 10 natural coral colonies were re-visited and monitored at the receptor site, Yam Tsai Wan. The conditions of the translocated and natural coral colonies during the Third Quarterly Post-Translocation Coral Monitoring are compared with the pre-translocation conditions which were recorded during the coral translocation exercise in October 2013.

Action and Limit Levels for the partial mortality of tagged corals were established based on the Pre-translocation Coral Monitoring results. By evaluating against the derived Action and Limit Levels, no exceedances of the Action and Limit Levels were identified during the Third Quarterly Post-Translocation Coral Monitoring on 24 July 2014. There thus did not appear to be any deterioration in the general conditions of the translocated and natural coral colonies at the receptor site, Yam Tsai Wan.

Overall, the coral translocation exercise is considered to be undertaken successfully as the translocated corals did not show any sign of deterioration in condition at the receptor site during this quarterly survey.

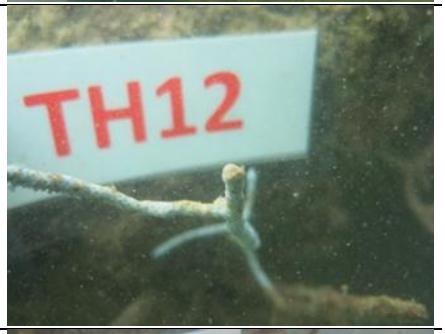
Findings of future Post-Translocation Coral Monitoring surveys will be presented in the subsequent Post-Translocation Coral Monitoring Reports in order to determine any observable changes in status of the translocated coral colonies. In the event that deterioration in conditions of the translocated corals is identified, monitoring would allow for implementation of appropriate remedial actions to mitigate such changes in condition.

Annex A

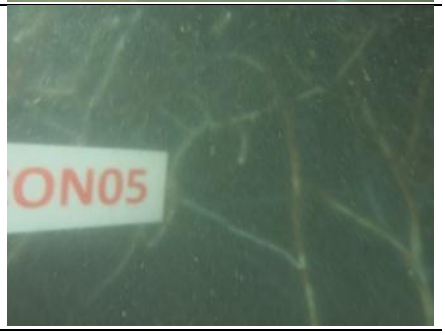
Photographic Records of Translocated and Tagged Natural Coral Colonies

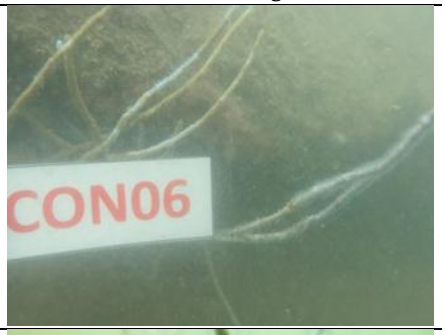
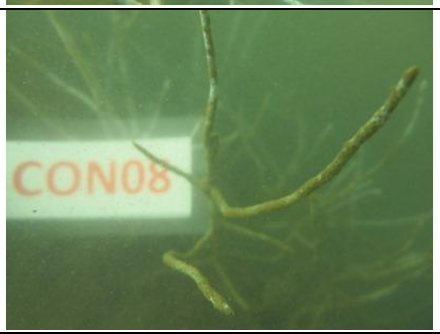
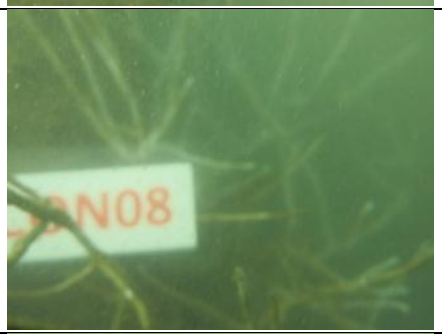
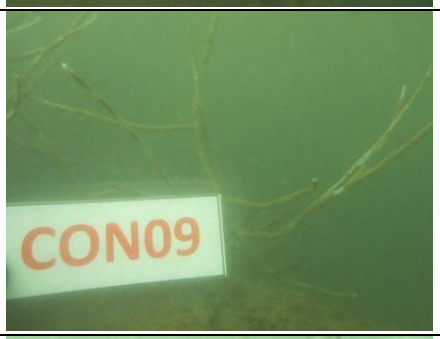
Coral #	Pre-Translocation Monitoring	3rd Quarterly Post-Translocation Monitoring
1		
2		
3		
4		
5		

6		
7		
8		
9		
10		

11		
12		
13		

A2 *Photographic Records of Tagged Natural Coral Colonies at Receptor Site, Yam Tsui Wan*

Coral #	Pre-Translocation Monitoring	3rd Quarterly Post-Translocation Monitoring
1		
2		
3		
4		
5		

Coral #	Pre-Translocation Monitoring	3rd Quarterly Post-Translocation Monitoring
6		
7		
8		
9		
10